

Case report

## Sudden death from a “broken heart” in a young woman

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### Abstract

A case of ruptured myocardial infarct in a young woman with no previous medical history is presented, as well as a review of the literature and forensic aspects are discussed.

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### 1. Case report

A 35-year-old woman with no previous medical history was found unconscious by her husband seated in the toilet. Despite medical resuscitation, the woman suddenly died. Due to the lack of previous medical history, an autopsy was performed. Extensive toxicological analysis revealed no abnormalities.

Retrospectively, we discovered that the patient complained of chest pain, one week and two months previously.

### 2. Autopsy findings

The findings were predominantly in the cardiovascular system. The pericardial sac contained 100 ml of fresh blood and a red clot of 220 g. There was an irregular rupture site of 2 cm diameter on the anterior wall of the left ventricle near the apex and in the interventricular septum (Fig. 1), where the myocardial muscle was aneurysmal and hemorrhagic (Fig. 2). The infarcted muscle was dark red, and measured at a maximum of 2 mm. The left ventricle lateral side was hypertrophic and measured at 21 mm (Fig. 3). The cardiac valves were slightly atheromatous. Assessment of the coronary arteries demonstrated a sub acute totally

obstructive thrombus of the distal interventricular artery, and a partially obstructive thrombus in its middle section (40% occlusion). Other significant macroscopic findings were hepatic and pulmonary congestion, and a slight cerebral edema.

Histological examination of the myocardium confirmed the presence of an acute infarct of the apex (left ventricular anterior wall and interventricular septum). Moreover, histological evaluation revealed older abnormalities which suggested a previous infarction, and in particular older ischemic lesions of the aneurismal wall (which measured less than 4 mm). The cause of death was therefore considered to be a ruptured myocardial infarct due to embolic interventricular artery occlusion on the aneurismal myocardium related to a previous ischemic lesion.

### 3. Discussion

In patients with acute myocardial infarction, left ventricular free wall rupture is an infrequent complication, generally estimated between 2% and 4% risk, but it is associated with a high mortality due to pericardial tamponade.<sup>1–8</sup> This accounts for 5–24% of all hospital deaths related to acute myocardial infarction.<sup>9,10</sup> Because of the dramatic decrease in autopsy rates, some authors believe that current studies have underestimated the rupture risk and do not accurately represent the frequency of this major complication. However, in certain reported articles, cardiac rupture as a

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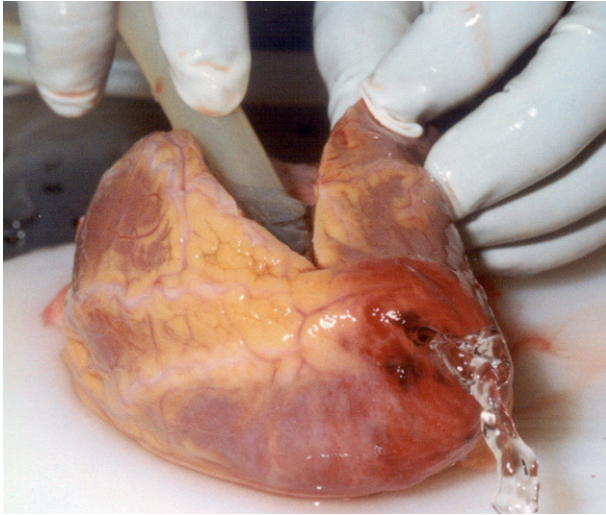


Fig. 1. Left ventricular rupture (water flows through the orifice).

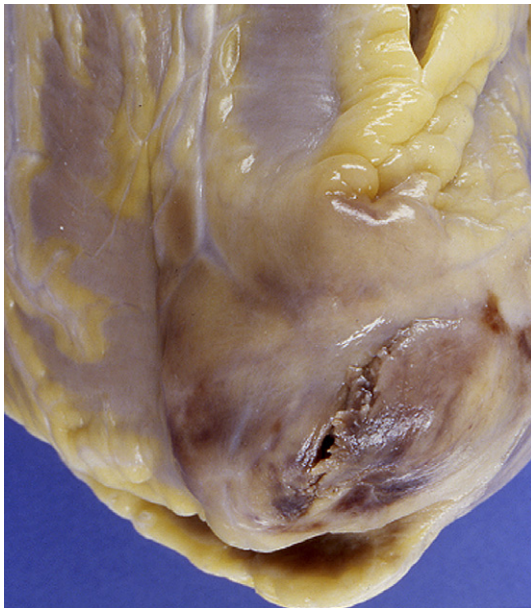


Fig. 2. Irregular ventricular rupture of the heart apex.

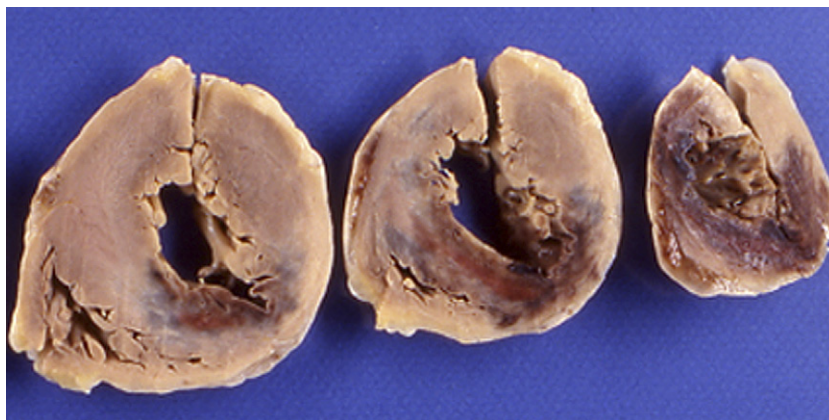


Fig. 3. Serial cuts in the heart apex show irregular rupture on the anterior wall of the left ventricle, hemorrhagic myocardial muscle, and thin dark red infarcted muscle. (For interpretation of the references in colour in this figure legend, the reader is referred to the web version of this article.)

complication of acute myocardial infarct (AMI) has been described as occurring in <1% to 10%<sup>6,11–13</sup> of patients, whereas a recent study demonstrated a higher rate of 30.7%.<sup>14</sup>

Characteristically, free wall rupture occurs in relatively elderly patients, generally older than 55 years and frequently between 65 and 70<sup>1,3–5</sup> with no apparent sex bias,<sup>3</sup> although it may be relatively more common in female patients in view of the lower incidence of acute myocardial infarction in women.<sup>4,5</sup> This confirms recent evidence that women experienced a more severe first heart attack.<sup>11,12</sup> In most cases, rupture following infarct occurs after the first heart attack and is transmural.<sup>2–4</sup> Rupture of the cardiac free wall could present as sudden death in a previously non symptomatic patient, as in our case,<sup>1–4,6–10</sup> and previous medical history of angina pectoris is infrequent.<sup>2</sup>

Additional risk factors, or triggering factors, for free wall rupture or any physical effort such as persistent coughing, vomiting, or agitation. Although free wall rupture occurs in infarcts of variable size, it is not infrequently found in association with a rather small area of lateral necrosis<sup>15–17</sup> and in some cases it may be associated with left ventricular hypertrophy, which seems to increase the risk of free wall rupture.<sup>1,2,18</sup>

Other cardiac rupture risk factors have been previously identified: systemic hypertension in 15% cases, cigarette smoking in 65% cases, diabetes mellitus in 55% cases, long lasting or recurrent history of chest pain prior to death in 70%, etc. . .<sup>19</sup>

Moreover, previous reports have suggested that external cardiac massage, in patients with AMI, can result in rupture of the left ventricle.<sup>20–22</sup> However, a recent article, based on pathological findings in 77 cases, demonstrated that external cardiac massage, for patients with AMI, did not provoke left ventricular rupture.<sup>23</sup>

Myocardial rupture is a major complication that often leads to sudden death. The subsequent cardiac tamponade after rupture results in rapid hemodynamic breakdown. The interval between rupture and collapse may be variable,

but is frequently short, even when the rupture hole is small. The time of rupture occurrence associated with acute myocardial infarction varies; most ruptures occur at an early stage, within the first 48 h. The early form represents 40–50% of cases, but the true proportion is likely to be higher because it will also include patients suddenly dying before reaching the hospital.<sup>23</sup>

Rupture of myocardium may be classified into three types<sup>24</sup>: (1) The blow-up rupture is one type in which a patient dies within minutes before arriving at the hospital; (2) the second type is the small rupture or leak through a fragile aneurysm, which can be surgically treated if proper intervention is carried out within a few hours; and (3) the third type is the chronic rupture, which has a similar formation as a false aneurysm.

According to the literature, heart weight is frequently above the predicted expected weight as a function of body weight. Rupture occurs in the free cardiac wall in 70% cases (left anterior wall 45%, left posterior wall 18%, left lateral wall 9%, apex 6%, right ventricular wall 1%) and in the ventricular septum in 30% cases.<sup>14,25</sup>

#### 4. Conclusion

This case underlines the importance of autopsy and histological examination in sudden death in young adults. It also demonstrates that myocardial rupture may occur in young patients, even in women with no evident previous medical history, or known cardio-vascular risk factor.

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